Chapter 7 Polynomial Functions

7-1 Polynomial Functions

ex

$7z^3 - 4z^2 + z$

Degree? 3 (In one variable)

Leading coefficient? 7

ex

$9y - 3y^2 + 4y^4$

Degree? 4

Leading coefficient? 4

ex

$3c^2 + 4c - 2c^{-1}$

Not a polynomial

Degree?_____

Leading coefficient?_____

ex $6a^3 - 4a + ab^2$

Not in one variable

$f(x) = 3x^2 - 3x + 1$

$f(4) = 3(4)^2 - 3(4) + 1$

$= 37$

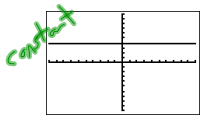
$f(-2) = 19$

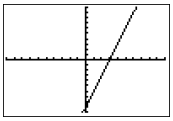
$p(x) = 2x^4 - x^3 + 3x$

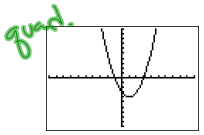
$p(y^3) = 2(y^3)^4 - (y^3)^3 + 3y^3$

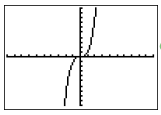
$p(y^3) = 2y^{12} - y^9 + 3y^3$

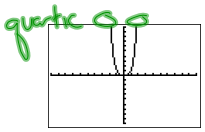
| Graphs of functions | | Degree |
|---|---|---|
| Constant | $f(x) = 4$ | 0 |
| Linear | $f(x) = 3x - 9$ | 1 |
| Quadratic | $f(x) = x^2 - 2x - 3$ | 2 |
| Cubic | $f(x) = x^3$ | 3 |
| Quartic | $f(x) = x^4$ | 4 |
| Quintic | $f(x) = x^5$ | 5 |

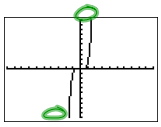



even

Same end behavior

odd

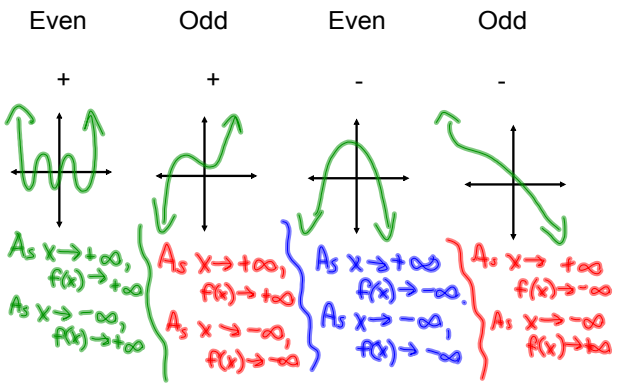
different end behavior

Let's look at the end behavior.

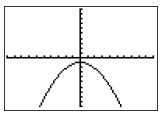
End Behavior--behavior of graph as x approaches $+\infty$ and $-\infty$

Determined by degree and leading coefficient

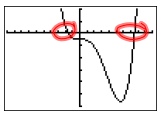
# Summary




Examples
a. Describe the end behavior.
b. Is the function odd or even?
c. State the number of zeros.

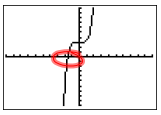


a. As x → $+\infty$, then f(x) → $-\infty$
As x → $-\infty$, then f(x) → $-\infty$
b. even
c. 0

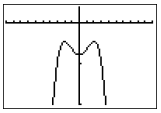


a. As x → $+\infty$, then f(x) → $+\infty$
As x → $-\infty$, then f(x) → $+\infty$
b. even
c. 2

Examples
a. Describe the end behavior.
b. Is the function odd or even?
c. State the number of zeros.



a. As $x \to +\infty$, then $f(x) \to +\infty$
As $x \to -\infty$, then $f(x) \to -\infty$
b. odd
c. 1



a. As $x \to +\infty$, then $f(x) \to -\infty$
As $x \to -\infty$, then $f(x) \to -\infty$
b. even
c. 0

HW
p350-351
16-21, 30, 34, 39-44